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Title: EXCAVATOR ATTACHMENT ;

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Applicant(s): ESSEX STUART A (AU); ESSEX WENDY P (AU) ;

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19880607 ;

IPC Classification: E02F9/00 ;

Equivalents: CA1329627 ;

ABSTRACT:

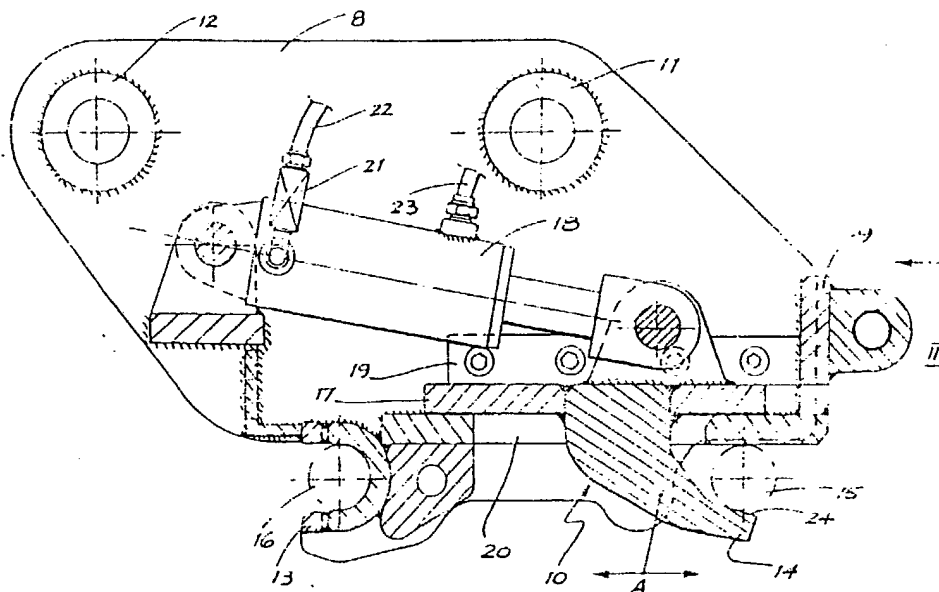
PCT No. PCT/AU87/00322 Sec. 371 Date Jun. 10, 1988 Sec. 102(e) Date Jun. 10, 1988 PCT
Filed Sep. 22, 1987 PCT Pub. No. WO88/02421 PCT Pub. Date Apr. 7, 1988. A hitch assembly
for mounting onto the articulated arm of a hydraulic excavator, backhoe or the like comprising
remotely operable jaws (14) for releasibly grasping the hinge pins (15, 16) of a bucket, rock
hammer or other device whereby such implements can be quickly and easily interchanged
without removal of said pins.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : E02F 3/96	A1	(11) International Publication Number: WO 88/ 02421 (43) International Publication Date: 7 April 1988 (07.04.88)
<p>(21) International Application Number: PCT/AU87/00322</p> <p>(22) International Filing Date: 22 September 1987 (22.09.87)</p> <p>(31) Priority Application Number: PH 8317</p> <p>(32) Priority Date: 3 October 1986 (03.10.86)</p> <p>(33) Priority Country: AU</p> <p>(71)(72) Applicants and Inventors: ESSEX, Stuart, Alexander [AU/AU]; ESSEX, Wendy, Pamela [AU/AU]; 3 Kamalinda Place, Yarrawarrah, NSW 2233 (AU).</p> <p>(74) Agent: ANDERSON-TAYLOR, Michael; 85A Carina Road, Oyster Bay, NSW 2225 (AU).</p> <p>(81) Designated States: AT, AT (European patent), BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent),</p>		<p>HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.</p> <p>Published <i>With international search report.</i></p>

(54) Title: EXCAVATOR ATTACHMENT



(57) Abstract

A hitch assembly for mounting onto the articulated arm of a hydraulic excavator, backhoe or the like comprising a pair of oppositely directed jaws (13, 14), one of which is fixed (13) and the other (14) being part of a hydraulically remotely operable slide mechanism (10), the jaws (13, 14) of said assembly releasably grasping the hinge pins (25, 16) of a bucket, rock hammer or other device whereby such implements can be quickly and easily interchanged without removal of said pins (15, 16).

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EXCAVATOR ATTACHMENT

This invention relates to construction machines and more particularly although not exclusively to hydraulic excavators or backhoes.

Excavators or backhoes when used for the removal of rock are normally fitted with hydraulic or pneumatic hammers which first break up the material so that it can be subsequently cleared with a bucket. This procedure however requires that the hammer and bucket be fitted alternately to the excavator and the swapping operation can take as long as 40 minutes with those machines which require the removal of the hinge pins normally connecting the hammer or bucket to the arm.

It is an object of this invention to ameliorate this disadvantage and accordingly a hitch assembly is disclosed for mounting onto the articulated arm of a hydraulic excavator or backhoe or the like and comprising remotely operable means for releasibly grasping the hinge pins of a bucket, rock hammer or other device whereby such implements can be quickly and easily interchanged without removal of said pins.

The currently preferred embodiment of this invention will now be described with reference to the attached illustrations in which:

Figure 1 shows a conventional mounting for a rock hammer on a hydraulic excavator,

Figures 2 and 3 show side and end views of a hitch assembly according to this invention which may be fitted between the hammer and articulated arm of the excavator of figure 1.

Referring first to figure 1 a hydraulic excavator is

indicated generally by the numeral 1 and has a rock hammer 2 mounted in the conventional manner onto the end of the articulated arm 3. The mounting arrangement comprises two parallel hinge or pivot pins 4 and 5 which allow the hammer to be directed at any required angle by the hydraulic ram 7. Although not shown a bucket or other implement could similarly be mounted in place of the hammer 2. With such conventional equipment however this requires the manual removal of each of the pivot pins 4 and 5 before the hammer can be detached from the arm and their subsequent refitting in order to mount another implement in place. The operation is therefore time consuming and laborious and adds significantly to equipment costs on jobs where the change over must be repeated a number of times.

The currently preferred hitch assembly according to this invention comprises a housing with side and end plates 8 and 9 which enclose a hydraulically operable slide mechanism 10 as will be described later. The upper portion of the housing includes two sets of aligned bushings 11 and 12 which are adapted to receive the aforementioned pivot pins 4 and 5. The hitch is thus mountable directly onto the excavator arm in place of the hammer or bucket. The lower portion of the hitch includes a pair of oppositely directed jaws 13 and 14. One of these jaws 13 is fixed and the other is movable in the directions indicated by arrow "A". With this jaw 14 withdrawn inwardly the lower portion of the hitch is thus able to be fitted between the parallel pivot pins of a bucket or hammer. The relative positions and size of these pins 15 and 16 in relation to the jaws 13 and 14 is shown in figure 2. In actual use however these pins 15 and 16 would extend through the upper portion of the hammer or bucket assembly. Subsequent outward displacement of the jaw 14 then serves to lock the hitch in place between the pins as shown in figure 2.

With this embodiment the displacement of jaw 14 is obtained by means of a slide plate 17 located within the hitch

housing . This plate is activated by means of a ram 18 which may be powered directly from the hydraulic system of the excavator. The plate moves within guides formed by ribs 19 along each side of the housing and directly below the plate there is an aperture 20. The jaw 14 is affixed to the plate 17 and extends down through the aperture 20.

The hydraulic circuit for the ram 18 preferably includes a valve assembly to insure that the jaw cannot be withdrawn from the pin 15 until a positive release is required. This is accomplished by means of a one way valve 21 which prevents hydraulic fluid once it enters the ram cylinder through conduit 22 from returning to the system even after a drop in supply pressure. The ram 18 can only be withdrawn by applying a positive pressure through a separate circuit which serves to both release the valve 21 and also act through conduit 23 against the opposite side of the ram piston.

Preferably the upper face 24 of the jaw 14 is inclined at an angle of about 18 degrees to the horizontal to provide a wedging action which serves to lock the hitch onto the pins without an unnecessarily high magnitude of force needing to be applied by the ram 18. This feature is particularly important when a rock hammer is used as the vibrations generated rapidly wear any mating surfaces which are not rigidly secured together.

As shown in figure 3 the side plates 8 of the housing preferably taper inwardly towards the lower portion of the hitch. This enables the jaws to interfit with the brackets of existing buckets or rock hammers.

In use the hitch is mounted between a hammer, bucket or other implement and the arm of the excavator. The parallel pins 4 and 5 (see figure 1) insert through bushings 11 and 12 to secure the hitch to the arm and the implement or bucket is in turn locked onto the hitch by means of the

jaws 13 and 14 as described earlier. The supply conduits 22 and 23 would also be connected to the hydraulic system of the excavator. A speedy and efficient interchange of implements is then possible by simple manipulation of the hydraulic controls of the excavator to thereby withdraw jaw 14 to release one device and subsequently extend it to grasp the pivot pins of the other.

It will thus be appreciated that this invention at least in the form of the embodiment described provides a novel labour saving attachment for construction machinery such as hydraulic excavators, backhoes or the like. Clearly however the particular example disclosed is only the currently preferred form of this invention and a wide variety of modifications may be made which would be apparent to a man skilled in the art. For example the shape and configuration of the housing for the hitch or the jaws may be changed according to design requirements and other mechanically or pneumatically equivalent systems may be substituted for the ram 18. Further a hitch assembly according to this invention is not limited to usage with buckets or rock hammers but may extend to a wide variety of other implements such as augers, drills, tampers, ripping teeth or grader blades.

The claims defining the invention are as follows:

1. A hitch assembly for mounting onto the articulated arm of a hydraulic excavator, backhoe or the like comprising remotely operable means for releasibly grasping the hinge pins of a bucket, rock hammer or other device whereby such implements can be quickly and easily interchanged without removal of said pins.
2. The hitch assembly as claimed in claim 1 wherein in use said remotely operable means is operated from the hydraulic system of the excavator, backhoe or the like.
3. The hitch assembly as claimed in claim 2 wherein said remotely operable means comprises a pair of oppositely directed jaws which are adapted to releasibly grasp said hinge pins.
4. The hitch assembly as claimed in claim 3 wherein one of said jaws is fixed and the other is movable between a withdrawn position in which said jaws can be fitted between said hinge pins and an extended position in which said pins are grasped by the jaws.
5. The hitch assembly as claimed in claim 4 wherein displacement of said other jaw is obtained by means of a slide plate located within the hitch housing, said plate being movable by a hydraulic ram.
6. The hitch assembly as claimed in claim 5 wherein said plate moves within guides on each side of the housing and directly below the plate there is an aperture through which said jaw extends.
7. The hitch assembly as claimed in claim 6 wherein the upper face of said other jaw is inclined at an angle so as to provide a wedging action which locks the hitch onto the pins.

8. The hitch assembly as claimed in claim 7 wherein said upper face is inclined at an angle of about 18 degrees.

9. The hitch assembly as claimed in claim 8 wherein the hydraulic circuit for the ram includes a valve which prevents release of the jaws once engaged even after a drop in supply pressure.

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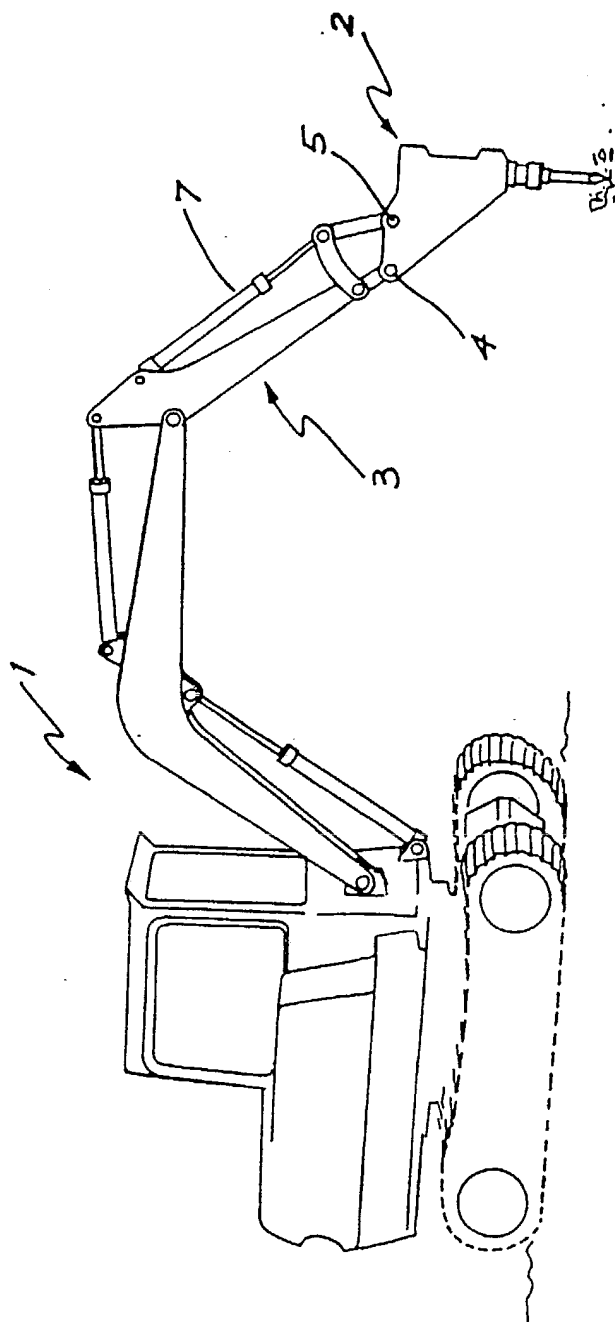
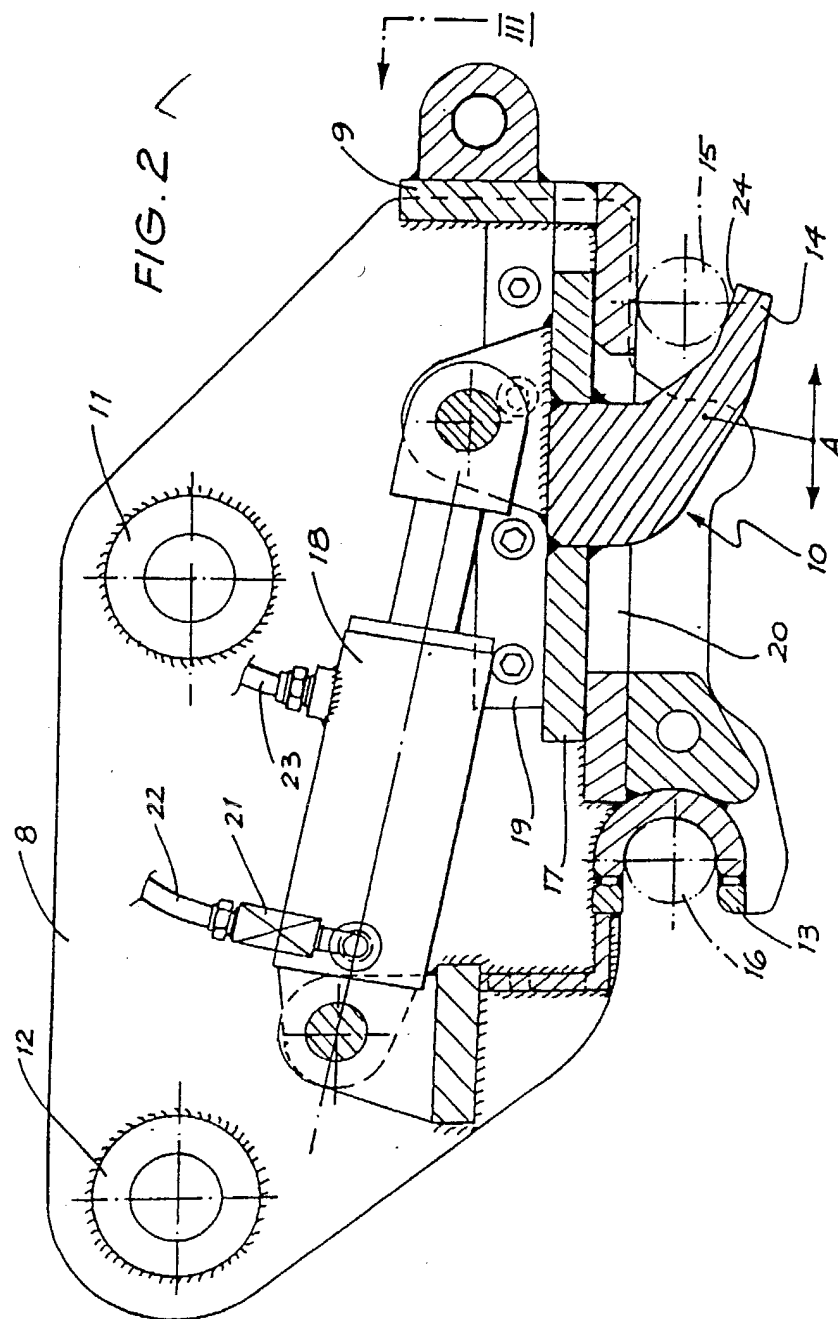


FIG. 1

2/3



3/3

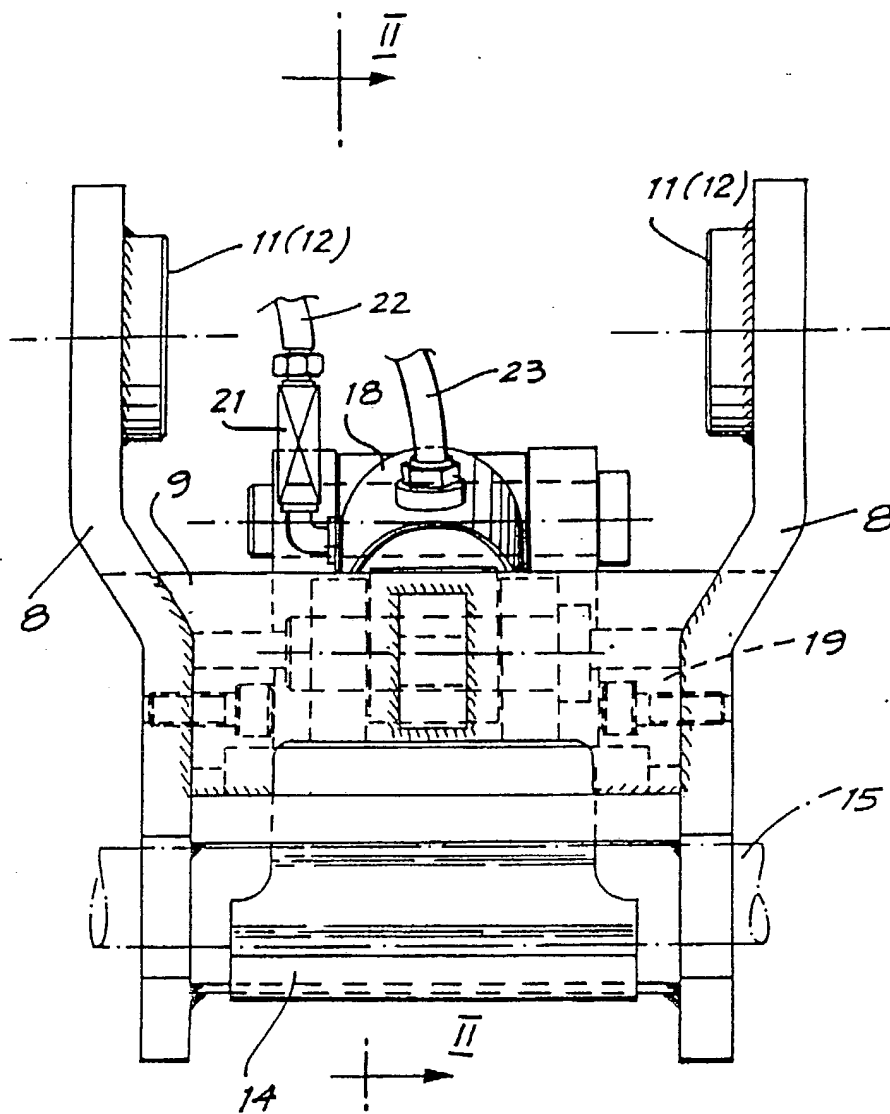


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No. PCT/AU 87/00322

I. CLASSIFICATION OF SUBJECT MATTER (1) Search classification symbols apply. Indicate all. ⁴ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int. Cl.⁴ E02F 3/96</div>																										
II. FIELDS SEARCHED <div style="text-align: center; font-size: 0.8em;">Minimum Documentation Searched⁵</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Classification System</td> <td style="width: 50%; border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; text-align: center;">IPC</td> <td style="border: none; text-align: center;">E02F 3/96</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched⁶</div> <div style="text-align: center; margin-top: 10px;">AU : IPC as above</div>			Classification System	Classification Symbols	IPC	E02F 3/96																				
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IPC	E02F 3/96																									
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁷ <table style="width: 100%; border: none;"> <tr> <th style="width: 10%; font-size: 0.8em;">Category⁸</th> <th style="width: 70%; font-size: 0.8em;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 20%; font-size: 0.8em;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="text-align: center;">X,P</td> <td>AU,A, 62019/86 (JONES) 5 March 1987 (05.03.87)</td> <td style="text-align: center;">(1-9)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>AU,B, 18602/83 (557890) (JONES) 8 March 1984 (08.03.84)</td> <td style="text-align: center;">(1-9)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>AU,A, 35627/84 (REDBAR PLANT HIRE PTY LTD) 30 May 1985 (30.05.85)</td> <td style="text-align: center;">(1-5)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>AU,A, 44122/85 (JONES) 12 June 1986 (12.06.86)</td> <td style="text-align: center;">(1-3)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>AU,B, 77154/81 (544156) (EIMCO (GREAT BRITAIN) LIMITED) 27 May 1982 (27.05.82)</td> <td style="text-align: center;">(1-2)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>GB,A, 2053142 (RAYGO INC.) 4 February 1981 (04.02.81)</td> <td style="text-align: center;">(1)</td> </tr> <tr> <td style="text-align: center;">X</td> <td>US,A, 3985249 (AKER et al) 12 October 1976 (12.10.76)</td> <td style="text-align: center;">(1)</td> </tr> </table>			Category ⁸	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X,P	AU,A, 62019/86 (JONES) 5 March 1987 (05.03.87)	(1-9)	X	AU,B, 18602/83 (557890) (JONES) 8 March 1984 (08.03.84)	(1-9)	X	AU,A, 35627/84 (REDBAR PLANT HIRE PTY LTD) 30 May 1985 (30.05.85)	(1-5)	X	AU,A, 44122/85 (JONES) 12 June 1986 (12.06.86)	(1-3)	X	AU,B, 77154/81 (544156) (EIMCO (GREAT BRITAIN) LIMITED) 27 May 1982 (27.05.82)	(1-2)	X	GB,A, 2053142 (RAYGO INC.) 4 February 1981 (04.02.81)	(1)	X	US,A, 3985249 (AKER et al) 12 October 1976 (12.10.76)	(1)
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>																										
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> Date of the Actual Completion of the International Search <div style="text-align: center;">4 December 1987 (04.12.87)</div> </td> <td style="width: 50%; border: none;"> Date of Mailing of this International Search Report <div style="text-align: center;">(16-12-87) 16 DECEMBER 1987</div> </td> </tr> <tr> <td style="width: 50%; border: none;"> International Searching Authority <div style="text-align: center;">Australian Patent Office</div> </td> <td style="width: 50%; border: none;"> Signature of Authorized Officer <div style="text-align: center;"></div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center;">4 December 1987 (04.12.87)</div>	Date of Mailing of this International Search Report <div style="text-align: center;">(16-12-87) 16 DECEMBER 1987</div>	International Searching Authority <div style="text-align: center;">Australian Patent Office</div>	Signature of Authorized Officer <div style="text-align: center;"></div>																				
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FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V.1. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
☐ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 87/00322

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members			
AU	35627/84	JP 60223536			
AU	44122/85	EP	184282	JP	61137927
AU	77154/81	CA	1181040	DK	5009/81
		ES	507192	ES	8207256
		GB	2087349	IN	153176
		US	4439938	ZA	8107596
EP				EP	52987
				FI	813625
				NO	813864
GB	2053142	DE	3021649	FR	2458635
				US	4253793
US	3985249	CA	1039241	DE	2616011
		GB	1492504	JP	51121902
				FR	2307752

END OF ANNEX